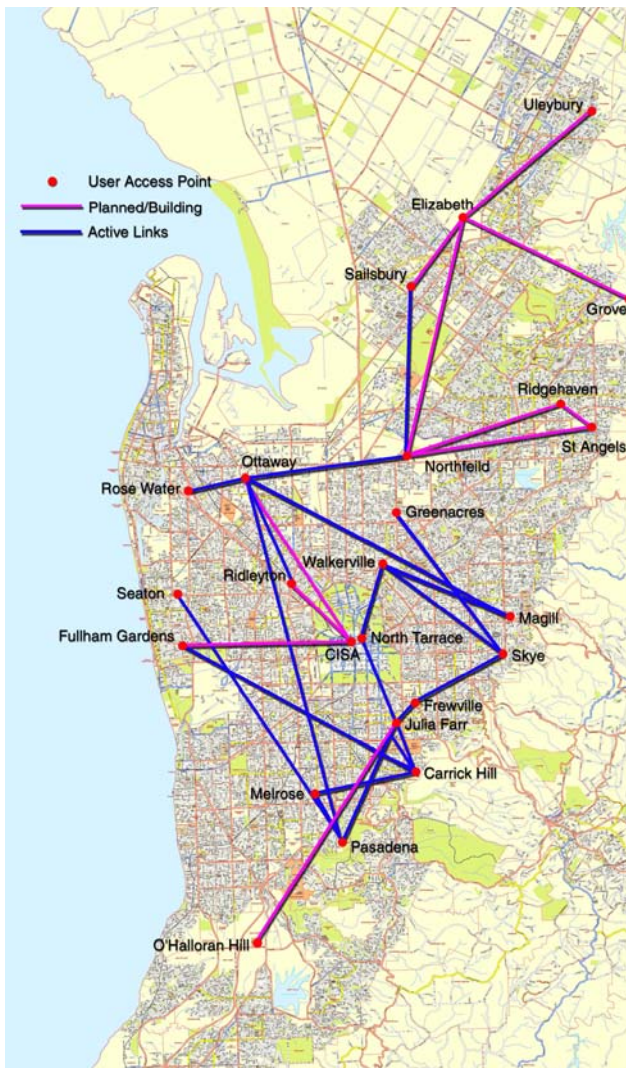


Until recently, the establishment of a Wide Area Network that provided for the interconnection of many computers over distance has required significant infrastructure investment. Overhead and underground cabling, satellites and telephone exchanges all incur large ongoing costs that are beyond the reach of the average user.

However, since the recent advent of low-cost, off-the-shelf wireless network equipment and the wide availability of open source systems, this is no longer the case and it is now possible for small groups of people to build large networks at very little cost.

Air-Stream, a not-for-profit community organisation, the first in South Australia to successfully build a Wide Area Network (WAN) using class license radio telemetry and open source technologies

Our aim is to deploy a low-cost community broadband infrastructure for sharing localised information such as websites, e-mail, voice, video and other forms of IP communications.



Access Points within the Air-Stream Network
(Adelaide, South Australia)

Since established in 2001 Air-Stream has successfully developed and deployed a working WAN across Adelaide. The network has been specifically designed to be low cost, using a combination of methods including wireless, open source, sub-netting, routing and multiple backbones connections.

Creating a model which we believe is highly reliable and robust and overcomes the many limitations of wireless networks alone.

Over the past few years, similar projects have rapidly been appearing in communities all over the world. Since Air-Stream's conception, groups of local community-minded people have been putting their heads and hands to work, creating the substantial network we enjoy today.

Currently, our membership includes IT professionals, engineers, radio amateurs, community groups, and enthusiasts, who are volunteering their time and resources to build and support this network.

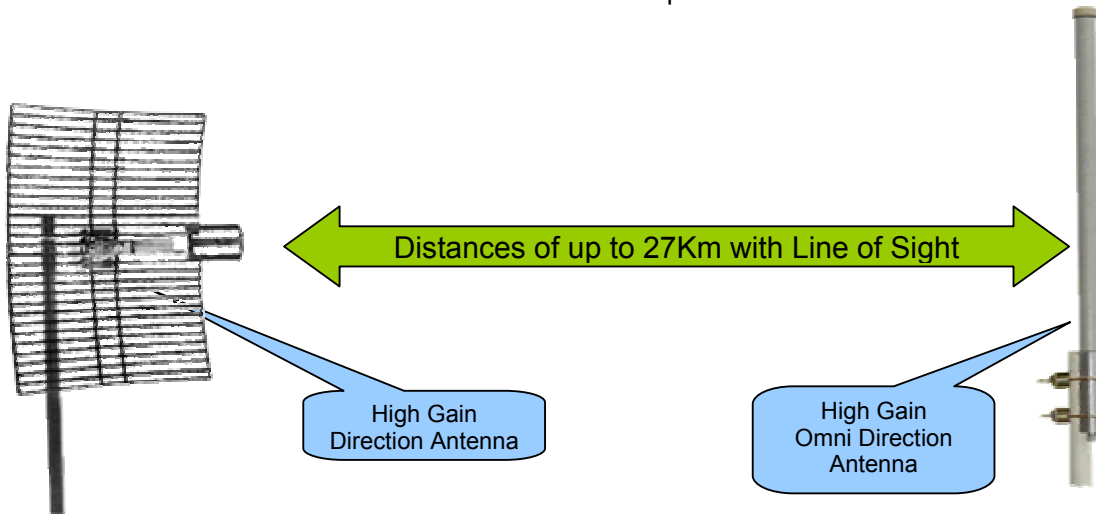
Air-Stream has pooled its skills and experience from members and other groups internationally to develop systems that, in terms of cost and flexibility, are outside the scope of commercial operations to deliver.

The network is rapidly growing and has now successfully linked many access points across metropolitan Adelaide.

The Wireless Equipment

The technology deployed uses off-the-shelf low power 802.11a or 802.11b spectrum spread devices (50 – 200mW) and as such requires “line-of-sight” between each point where the distance is greater than 300 metres.

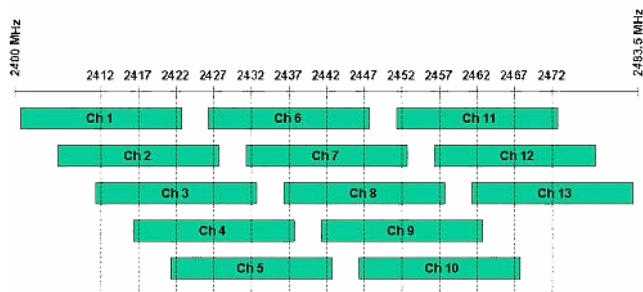
Nevertheless, due to the high frequencies used low-cost high-gain antennas can allow networks to be established over much greater distances, sometimes in excess of 20km. Consequently, at each site where equipment is installed a mast is erected to provide the greatest access for users wishing to connect and for backbones to connect with other access points in the network.



802.11b 2.4 GHz

Access Points (AP) where connections are made by users to the network support the 802.11b standard and may support over 30 users at sustainable broadband speeds per AP.

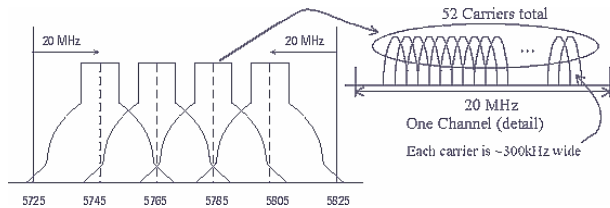
This standard operates on the license free radio spectrum and provides the most reliable and cost-effective solution available today. Using these devices it is possible implement up to three 802.11b APs without interference in the same location or 5 APs where equipment can be spaced apart and sector antenna used in different polarizations. AP sites can be located between 0.5 and 10Km apart depending on terrain.



802.11a 5.8 GHz

The 802.11a standard also operates on the license free radio spectrum, but until recently the 802.11a has not been popular for use as APs because of the low availability and high cost. Nevertheless manufactures have begun manufacturing multi standard 802.11a, b & g devices that are supported by Open Source drivers, reducing cost. The higher frequency and lower interference of this standard makes them an ideal choice for backbones and frees up channels for User APs and it is possible to implement up to as many as four 802.11a dedicated backbones between each site, without interference

802.11a standard has a bandwidth of up to 54Mbps which not only offers more than enough bandwidth to support users of multiple APs but also provides the capacity to interconnect multiple sites together into a routed framework.



Radio Communications Act

Under the Radio Communications Act, which covers the use of radio communications equipment within the radiofrequency spectrum, a license is required.

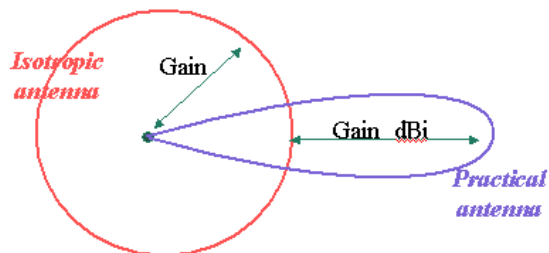
However, there are some spectrums that have been but aside for public use termed “class license”. Users of these spectrums do not require a license, provided specific measures are complied with.

The 802.11a and 802.11b wireless network equipment used by Air-Stream complies with the class license requirements and as such no licensing is required.

Under a class licence, all users operate in the same spectrum segment on a shared basis and are subject to the same conditions. A class license governs the frequencies that may be used, commonly prescribes equipment standards, and may specify other technical and operational parameters.

Spread spectrum devices are restricted the following frequency bands and power limits.

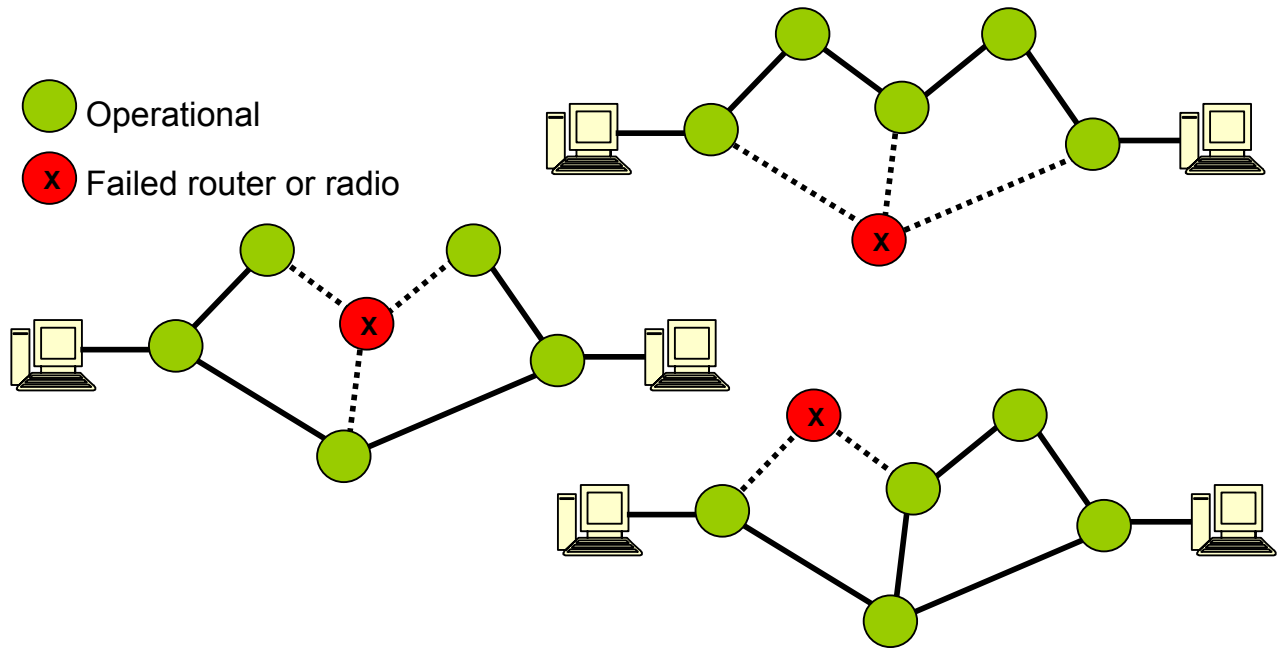
- 915 to 928Mhz is 1 watt
- 2400 to 2483.5Mhz is 4 watts
- 5725 to 5875Mhz is 1 watt



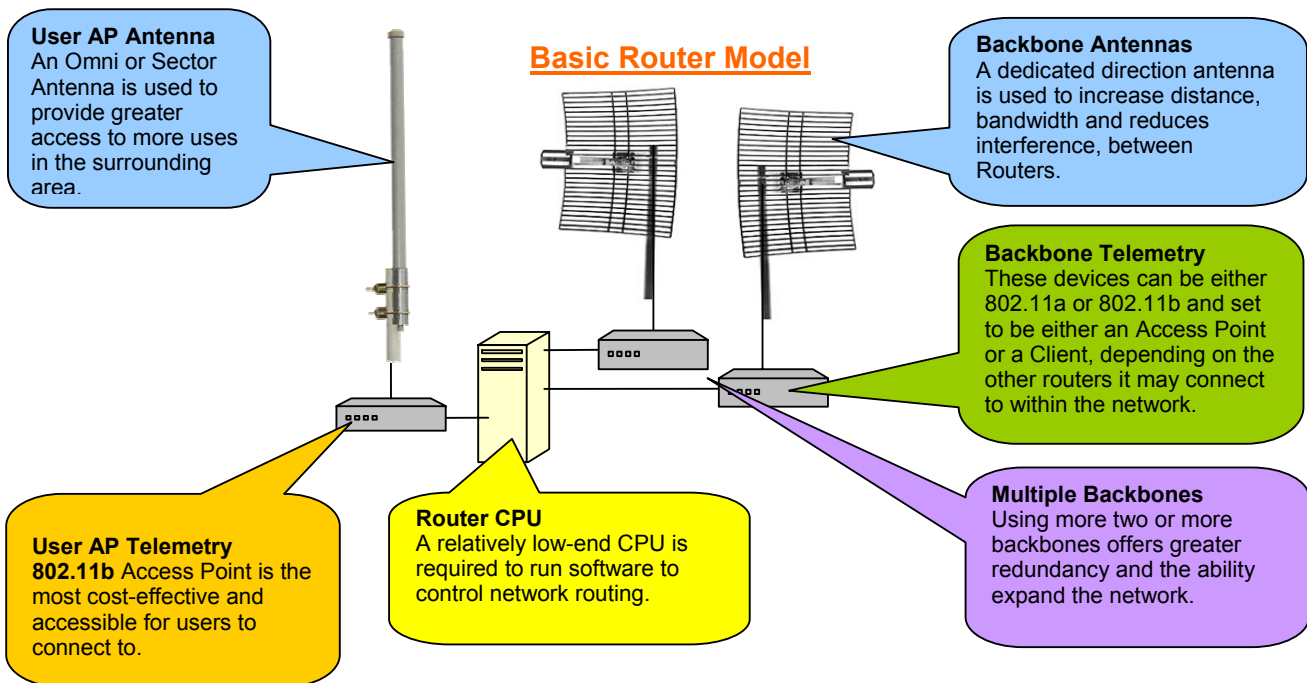
Note: Power is the maximum equivalent isotropically radiated power (EIRP) e.g. output power of AP increased by antenna gain.

Wide Area Networks and Routing

The Internet is a Wide Area Network (WAN) and is built by connecting smaller networks together using multiple connections and software that controls traffic across these connections. Layer 3 systems such as BGP ensure data can traverse the network even if parts of the network are broken or over-loaded.



This offers a highly reliable and robust model for wireless networks overcoming many of the limitations of 802.11a and 802.11b wireless technologies on their own.



Network Content

A WAN is an ideal infrastructure for sharing IT resources such as WebPages, Email, IRC, VoIP, Video/Audio streaming, Internet and any other IT systems that can be used over a network.

The network is configured to support Internet Protocols, so software used for the Internet can be used without any modification and is freely available, e.g., Internet Browsers, Email Clients, IRC, VoIP and any other system used over the Internet.



Amateur Radio

Amateur Radio operators have connections from their digital packet network into the Air-Stream network. Packet radio makes use of a protocol called AX25, which makes use of modulation of a radio frequency signal.

However, AX25 can also be carried over the TCP/IP protocol (which the Air-Stream network uses). Hence many Amateur Radio functions can run in an integrated, seamless fashion over the wireless network, and many new functions become feasible due to its much higher speed. Some of the functions that are possible include:

- BBS Access**
- Forwarding**
- Program Libraries**
- Voice Over IP**
- Web Pages**
- APRS**
- DX Cluster**



Origin	Size	To	Route	From	Topic
04-May	325	WF		VK5APC	WP Update
04-May	191	WF		VK5BRC	WP Update
04-May	123	WF	VK5EAR	VK5SPG	WP Update
04-May	123	WF	VK5SO	VK5SPG	WP Update
04-May	123	WF	VK5ALE	VK5SPG	WP Update
04-May	123	WF	VK5APC	VK5SPG	WP Update
04-May	123	WF	VK5BRC	VK5SPG	WP Update
04-May	123	WF	VK5HB	VK5SPG	WP Update
04-May	123	WF	VK5LZ	VK5SPG	WP Update

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[New Message](#)



Telecommunications Act

Under the Telecommunications Act a carrier license authorises the use of network units for the supply of telecommunications services to the public.

The Air-Stream Network, as a not-for-profit incorporated body, falls within the meaning of 'exempt network'. Under subsection 34 (3) of the Telecommunications Act 1997, the owner of the exempt network is not required to hold a carrier license.

An exempt network includes WLAN that are used for the sole purpose of supplying carriage services on a non-commercial basis.



Security

Wireless networks operate in the same way as the Internet, so precautions should be taken to protect computers or LANs connected to it. This can be done on several levels and, as the network is tightly managed, it employs a number of security measures, such as:

- Access point equipment can be encrypted providing security between the users and an access point.
- Users may firewall and protect their computers using the same tools and applications available for the Internet.
- Being a routed network, each AP manages its own subnet and traffic between each host can be highly controlled.
- Users may also deploy encrypted virtual private networks (VPNs) as another layer, providing additional layer of security

